Question Number	Scheme	Marks
9.(a)	$\mathbf{A}=\begin{pmatrix}6 & 4\\ 1 & 1\end{pmatrix}$, $\text{Area}(R)=10$, $\mathbf{B}=\mathbf{A}^4$	
	$\det(\mathbf{A})=6(1)-4(1)$	M1
	$\det(\mathbf{A})\neq 0$ (so $\mathbf{A}$ is non-singular)	A1
		(2)
(b)	$\text{Area}(S)=2(10)=20$	M1A1
		(2)
(c)	$\text{Area}(T)=2^4(10);=160$	M1A1
		(2)
		Total 6

Notes

(a)

M1: Correct attempt at the determinant. The working for the determinant must be seen in part (a)

A1: $\det(\mathbf{A})=2$ or $(6-4)$ **and** some reference to not being zero e.g. $2\neq 0$ is sufficient

Stating e.g. $\det(\mathbf{A})>0$ etc is insufficient for this mark

(b)

M1: their $\det(\mathbf{A})\times 10$ $(10\div$ their $\det(\mathbf{A})$ is M0)

A1: 20

(c)

M1: $(\text{their } \det(\mathbf{A}))^4\times 10$ $(10\div(\text{their } \det(\mathbf{A}))^4$ is M0)

A1: 160

Accept use of $\mathbf{A}^2$

e.g. $\mathbf{A}^2=\begin{pmatrix}40 & 28\\ 7 & 5\end{pmatrix}\Rightarrow|\mathbf{A}^2|=4\Rightarrow\text{Area}(T)=4^2(10);=160$ Is acceptable

M1: $(\text{their } \det(\mathbf{A}^2))^2\times 10$

A1: 160

BUT there must be no attempt to evaluate $\mathbf{A}^4$ to give $\det\mathbf{A}^4=16$

If they think $\det(\mathbf{A})=\dfrac{1}{\det(\mathbf{A})}$ then no marks in (a) but allow M's in (b) and (c).

So e.g. if they have $\det(\mathbf{A})=\dfrac{1}{6-4}=\dfrac{1}{2}$ in (a) then M0A0 in (a)

But if they then have $10\times\dfrac{1}{2}$ in (b) this can score M1A0 in (b)

If they have $10\times\left(\dfrac{1}{2}\right)^4$ in (c) then this can score M1A0 in (c)

$$\text{NB } \mathbf{A}^4=\begin{pmatrix}6 & 4\\ 1 & 1\end{pmatrix}^4=\begin{pmatrix}1796 & 1260\\ 315 & 221\end{pmatrix}$$